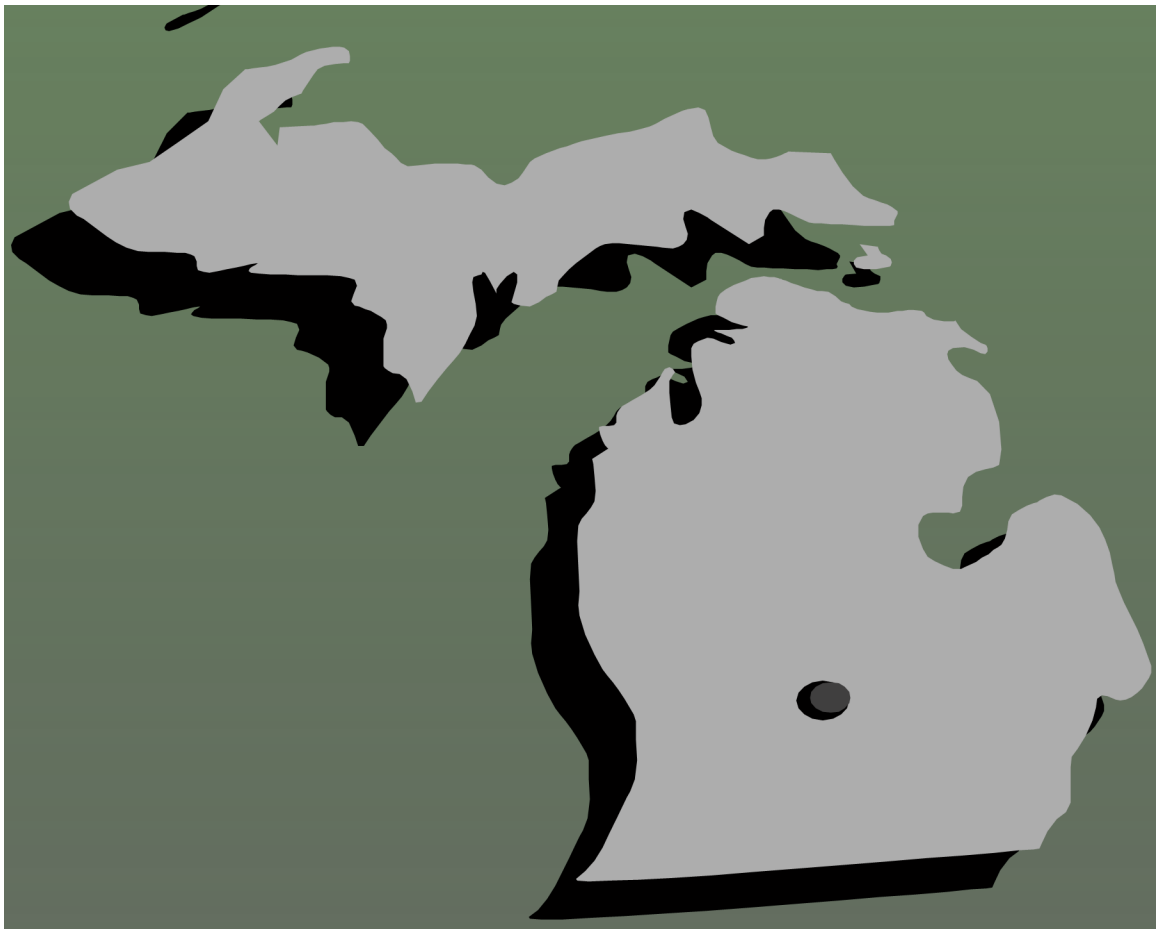
September 30, 2019

2017 Annual Report

Summary of Occupational Disease Reports to the Michigan Department of Licensing & Regulatory Affairs



2017 ANNUAL REPORT SUMMARY OF OCCUPATIONAL DISEASE REPORTS TO THE MICHIGAN DEPARTMENT OF LICENSING & REGULATORY AFFAIRS

Occupational Disease Surveillance Program

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There are many ways to report occupational diseases to the state:

ONLINE:

www.oem.msu.edu

EMAIL:
ODReport@ht.msu.edu

FAX:

517.432.3606

TELEPHONE:

1.800.446.7805

MAIL:

MIOSHA
Technical Services Division
530 W Allegan St
PO BOX 30649
Lansing, MI 48909

Michigan State University Department of Medicine

West Fee Hall
909 Fee Road, Room 117
East Lansing, MI 48824
517.353.1846

Kenneth D. Rosenman, MD
Mary Jo Reilly, MS

Michigan Department of Labor and Economic Opportunity (LEO)

PO Box 30643
Lansing, MI 48909

517.284.7777

Barton G. Pickelman
Director MIOSHA

There are many resources available to help employers, employees, healthcare professionals and others understand more about work-related diseases. Links to these resources can be found at: **www.oem.msu.edu**.

Acronyms

BLS Bureau of Labor Statistics

LARA MI Department of Licensing & Regulatory Affairs

LEO MI Department of Labor and Economic Opportunity

MDHHS Michigan Department of Health and Human Services

MIOSHA Michigan Occupational Safety and Health Administration

MSU OEM Michigan State University Occupational and Environmental Medicine

NAICS North American Industrial Classification System

NIOSH National Institute for Occupational Safety and Health

OD Report Occupational Disease Report

WCA Workers' Compensation Agency

This report was funded by the National Institute for Occupational Safety & Health, under cooperative agreement U60-OH008466.

Background

This is the 26th annual report on occupational diseases in Michigan, and is based upon the reports submitted to the Michigan Department of Licensing and Regulatory Affairs (LARA) in calendar year 2017. Since 1978, physicians, hospitals, clinics, other health professionals and employers have been required by the Michigan Public Health Code (Article 368, Part 56, P.A. 1978, as amended) to report known or suspected cases of occupational diseases. LARA designates Michigan State University's College of Human Medicine, Occupational and Environmental Medicine Division (MSU OEM) as its bona fide

Part 56 of the Michigan Public Health Code requires reporting of all known or suspected occupational illnesses or work-aggravated health conditions to the Michigan Department of Licensing & Regulatory Affairs *within 10 days of discovery*.

In 2017, 894 (1.4%) of the 62,911 human exposure-related calls to the Michigan Poison Control Center were related to occupational exposures.

Background continued...

agent to compile and analyze the occupational disease reports.

A standard form is used to report individuals with a known or suspected work-related condition. It requests medical and demographic information on the affected employee as well as information about the facility at which the employee became ill. Figure 1 is a copy of the Known or Suspected Occupational Disease Reporting Form.

Reports received are reviewed by MSU OEM staff and computerized.

In some cases, additional follow-up is conducted. The reported patient may be contacted and interviewed by staff at MSU OEM to obtain more information about their illness. A Michigan Occupational Safety and Health Administration (MIOSHA) enforcement inspection may be initiated at the patient's workplace to assess current working conditions and determine if other employees are experiencing similar health issues.

Reports are analyzed on a yearly basis and the results are shared with health professionals and other stakeholders.

Figure 1. Occupational Disease Reporting Form

Michigan Department of Licensing and Regulatory Affairs — MIOSHA Technical Services Division

Known or Suspected Occupational Disease Report

(Information will be held confidential as prescribed in Public Act 368 of 1978.)

EMPLOYEE AFFECTED

Name (Last, First, Middle)	Age / Sex M F / Race: White Black Hispanic Other	
Street	City	State / Zip
Home Phone Number	Last Four Digits of Social Security Number (Optional)	

CURRENT EMPLOYER

Current Employer Name	Worksite County	
Worksite Address	City	State / Zip
Business Phone	If Known, Indicate Business Type (products manufactured or work done)	
Number of Employees: <25 25-100 100-500 >500		
Employee's Work Unit/Department	Dates of Employment From: Mo Day Year To: Mo Day Year	
Employee's Job Title or Description of Work		

ILLNESS INFORMATION

Nature of Illness or Health Condition (Examples: Headache, Nausea, Difficulty Breathing, Cough, etc.)		Date of Diagnosis Mo Day Year
Suspected Causative Agents (Chemicals, Physical Agents, Conditions)	Did Employee Die? Yes No	If Yes, Date of Death Mo Day Year
If Physician, Indicate Clinical Impression for Suspected Occupational Disease, or Diagnosis of Confirmed Occupational Disease		

ADDITIONAL COMMENTS

REPORT SUBMITTED BY

If Report Submitted by Non-Physician, Did Employee See a Physician? *If yes, record information below.* Yes No Don't Know

Physician's Name	Phone		
Office Address	City	State	Zip
Name of Person Submitting Report	Physician Non-Physician		
Address	City	State	Zip
Signature	Phone		Date

The Michigan Department of Licensing Regulatory Affairs is an equal opportunity, affirmative action employer, service provider and buyer.

Return completed form to:

Michigan Department of Licensing and Regulatory Affairs (LARA)
Michigan Occupational Safety and Health Administration (MIOSHA)
Technical Services Division (TSD)
530 W. Allegan Street, P.O. Box 30649, Lansing, MI 48909-8149
Overnight Mail Address: 525 W. Allegan Street, Lansing, MI 48933

MIOSHA-MTSD-51 (04/16)

Authority: P.A. 368 of 1978
Completion: Required
Penalty: Misdemeanor

METHODS

An occupational disease (OD) report is initiated when a clinician knows or suspects that a patient's illness is work-related. Reports are submitted by or requested from a variety of sources, listed below. Additional reports are generated through annual review of the Michigan Health and Hospital Association inpatient database.

SOURCES TO IDENTIFY PATIENTS

- **Health Care Providers** Private practice, working for industry, NIOSH-certified "B" readers, audiologists, clinics
- **Employers**
- **Hospitals** for International Classification of Diseases—10th Revision (ICD-10)[1] beginning October 1, 2015 and includes J45, J62, J63, J64, J65, J66, J67, J68, Z57.2, Z57.3, Z57.5 and other select work-related conditions
- **Workers' Compensation Agency**
- **Poison Control Center** data for work-related poisonings
- **Reports from Co-Workers or MIOSHA Field Staff** confirmed by a health care provider
- **Death Certificates** for ICD-10 Cause of Death (COD) or contributing COD J61, J62.8, J63, J64, J65, J67; if Underlying COD J45, J68
- **3rd Judicial Circuit State Court of Michigan** for asbestos-related disease
- **Mine Safety and Health Administration**
- **Michigan Cancer Registry** for mesothelioma
- **Clinical Laboratories** for blood lead analyses, and specific IgE allergy testing

OD reports are used to direct surveillance, intervention and prevention activities. The computerized OD report information includes: 1) employee name, age, sex, race, zip code and optional partial social security number; 2) employer name, worksite address, city, zip code, number of persons employed at the facility and an assigned North American Industry Classification System (NAICS) code; 3) details of the illness, diagnosis date, suspected causative agent(s), vital status, and assigned ICD-10 code; and 4) information about the report submitter, including whether they are employed by the company, an outside medical department contracted by the company, or a private practice health professional.

More than one report on a given individual with different work-related diseases may be submitted to LARA within a given year and across multiple years. If several reports are submitted for acute illnesses for a single individual, all of the reports are included in our statistics. In contrast, if more than one report is submitted in a given year for a chronic disease in a single individual, only one of the submissions is included in our statistics. If multiple reports are submitted over several years on that individual's chronic disease, only the earliest report is included in our statistics (see list below for chronic diseases).

The 2016 Annual Report on Silicosis & Other Work-Related Lung Disease contains information on Asbestos-related lung disease that was formerly in the OD Annual Reports. The report can be found at: www.oem.msu.edu

CHRONIC OCCUPATIONAL DISEASES COUNTED ONLY ONCE

ICD-10	DESCRIPTION
A15.0	Pulmonary TB
A18.0	TB of Bones & Joints
D86	Sarcoidosis
B90	TB, Late Effects of
C00-D49	Cancer
E20-E35	Diseases of Other Endocrine Glands
E50-E64	Nutritional Deficiencies
E70-E88	Metabolic & Immunity Disorders except E86.0 [276], Dehydration
D50-D89	Diseases of the Blood & Blood Forming Agents
F01-F99	Mental Disorders except F43 [308 (Acute Reaction to Stress) & 309 (Adjustment Reaction)]
G00-G99	Select Diseases of the Nervous System & Sense Organs
H90-H91	Noise-Induced Hearing Loss, Tinnitus
I00-I99	Select Diseases of the Circulatory System
J40-J47, J60-J70	Select Diseases of the Respiratory System, Pleural Plaques w/no Parenchymal Abnormality on ILO form
J80-J84	Interstitial Lung Disease, Pulmonary Fibrosis
L94.9	Connective Tissue Lung Disease
K00-K95	Diseases of the Digestive System
N00-N99	Diseases of the Genitourinary System

RESULTS

A total of 7,467 occupational disease reports were submitted to LARA in calendar year 2017. Figure 2 shows the number of reports received each year since 1985.

Reporting Source

Company or contract medical departments submitted 62% of the reports (4,664 cases); non-company associated health care practitioners submitted 38% of the reports (2,803 cases). Figure 3 shows the trends by reporting source (company or non-company associated) since 1991.

Company Size

Half of the reports were submitted on individuals who worked in large companies (Table 1) with 2,767 of the 5,062 reports that listed company size coming from businesses with > 500 employees.

A greater proportion of reports for companies with 500 or fewer employees come from non-company health practitioners. About 75% of the 658 reports with known company size that were submitted by non-company practitioners involved companies with < 500 employees, while about 41% of the 4,404 reports with known company size submitted by company practitioners involved facilities with < 500 employees.

Non-Company Clinicians

Sixty-eight non-company-associated clinicians reported 129 incidents of occupational disease. Twenty-four labs were responsi-

Figure 2
OD Reports to LARA by Year Reported: 1985-2017

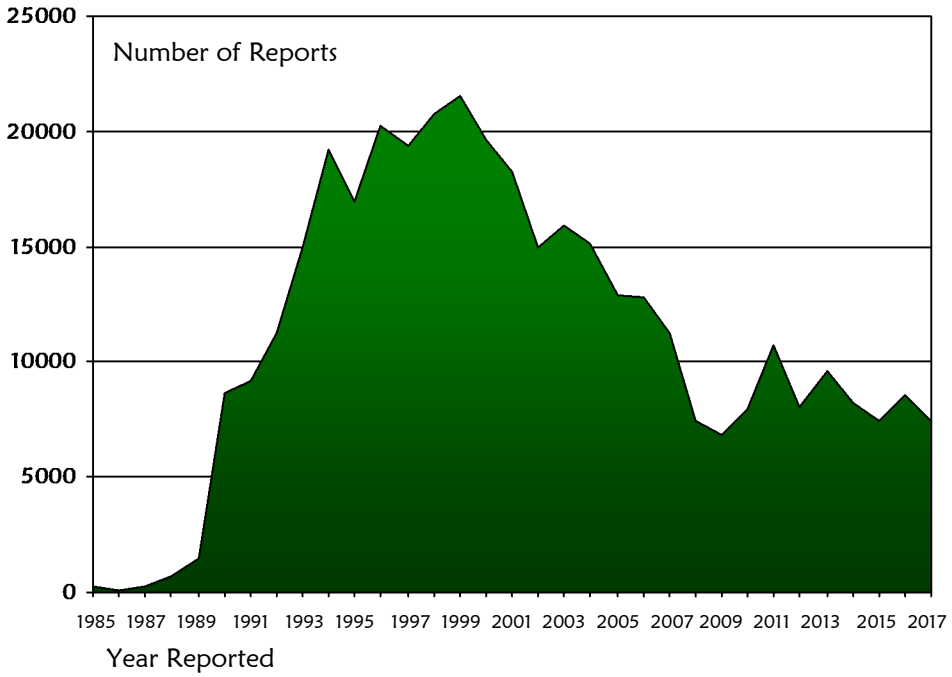
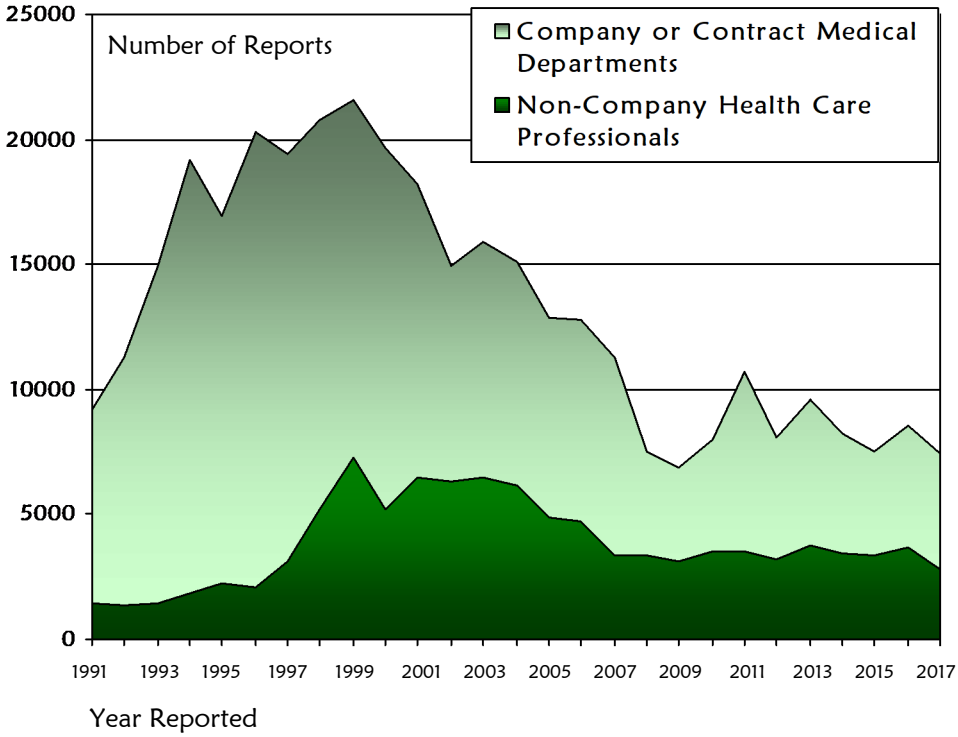


Figure 3
OD Reports by Year and Reporting Source: 1991-2017



RESULTS, continued...

ble for identifying 1,548 reports of elevated blood lead level. In addition, the Michigan Poison Control Center reported 894 incidents of work-related poisonings, the 3rd Circuit Court of Michigan reported 203 asbestos-related claims, hospitals reported 28 patients with work-related illnesses and one lab reported one latex allergy. Sixty-two (91%) of the clinicians reported only one patient each in calendar year 2017 (Table 2); one clinician reported 48 patients; this clinician is certified to interpret chest x-rays for dust-related lung disease ("B" reader). A "B" reader is a licensed physician who has passed a test on interpreting chest x-rays for pneumoconiosis and maintains certification by passing an additional test every four years. In 2017, there were five Michigan physicians who were listed as a "B" reader on the NIOSH "B" reader website (https://www.cdc.gov/niosh/topics/chestradiography/breader-list.html).

Occupational Health Clinics

There are approximately 195 occupational health clinics in Michigan. From June 2005 to 2009, the number of such clinics reporting occupational disease cases to the State increased from 21 to 56. In 2010, the number of reporting clinics dropped to 44, in 2011 increased to 64, in 2012 decreased to 61, in 2013 increased to 66, in 2014 decreased to 46, in 2015 decreased to 39, in 2016 decreased to 37, and in 2017 increased to 42. Biennial audits of a sample of non-reporting clinics began in 2009.

Table 1
Company Size at Facilities with an OD Report in 2017: Non-Company v Company Clinicians

Number of Employees	REPORTING SOURCE					
	Non-Company Clinicians		Company Clinicians		Total Reports	
	#	%	#	%	#	%
< 25	242	36.8	488	11.1	730	14.4
25-100	126	19.1	716	16.3	842	16.6
100-500	127	19.3	596	13.5	723	14.3
> 500	163	24.8	2,604	59.1	2,767	54.7
Total	658[a]		4,404[b]		5,062	

[a] The number of employees was missing on 2,145 reports.
[b] The number of employees was missing on 260 reports.

Table 2
OD Reports Submitted by Non-Company Clinicians in 2017

Number of Reports	Clinicians		Patients
	#	%	#
1	62	91.2	62
2-10	4	5.9	8
>11	2	2.9	59
Total[a]	68		129

[a] Includes reports only from individual clinicians.

Demographics

Table 3 shows the age, gender and race distribution of the workers with occupational diseases reported in the year 2017. The mean age of reported patients was 45 ± 15 years (range, 14 to 95 years) with approximately 62% of the patients between the ages of 25 and 54 years. Eighty-one reports were submitted for patients age 19 or younger, and 68 reports were submitted for patients age 80 and older.

Sixty-seven percent of all reports submitted were for male workers. Ninety-six percent of the submitted reports (7,163 cases) did not indicate the worker's race. Of the 304 reports that did indicate race, 81% were Caucasian, 16% were African American and 4% were Hispanic.

RESULTS, continued...

Table 3
Demographic Characteristics of Occupational Disease Cases Reported in 2017

Demographic Characteristic		
Age	#	%
≤ 19	81	1.7
20-24	319	6.5
25-29	487	10.0
30-34	488	10.0
35-39	458	9.4
40-44	497	10.2
45-49	615	12.6
50-54	505	10.3
55-59	501	10.3
60-69	679	13.9
70-79	188	3.8
> 80	68	1.4
Total[a]	4,886	
Gender	#	%
Male	4,975	67.3
Female	2,414	32.7
Total[b]	7,389	
Race	#	%
Caucasian	246	80.9
African American	47	15.5
Hispanic	11	3.6
Total[c]	304	

[a]Age was unknown for 2,581 reports. Mean age 45 ±15 yrs.
[b]Gender was unknown for 78 reports.
[c]Race was unknown for 7,163 reports.

Younger Workers

Of the 46 workers *age 18 and younger*, one was 14 years old, three were 15, nine were 16, 10 were 17, and 23 were 18 years old. Sixteen (37%) of the reported patients age 18 and younger were female and 27 (63%) were male. Gender was unknown for three cases. Place of employment was unknown for 40 of the 46 younger workers. Of the six with known employment, three worked in auto manufacturing and one each worked in resale, a car wash and chemical manufacturing.

Forty-three of the younger workers were reported by private practice clinicians not associated with any company and three were reported by their company medical physician. Thirty-four were reported by the Poison Control Center, two were for respiratory symptoms, six were for an elevated blood lead level (serum lead levels were between six and 10 micrograms per deciliter), two were for repetitive trauma disorders, and one each were for contact dermatitis and exposure to an infectious disease. No work-related *fatal illnesses* for workers age 18 or younger were identified in 2017.

Older Workers

Of the 68 workers age eighty and older, 60 (88%) were between 80 and 89 years, and eight (12%) were between 90 and 95 years old. Fifty-five were men and 13 were women. Five each of the older patients worked in or were retired from manufacturing and construction. Industry or former industry was not indicated in 58 reports.

Private practice clinicians not associated with any company reported 64 of the 68 patients. Thirty-five of the older workers were reported for an elevated blood lead level (serum lead levels were between 5 and 25 micrograms per deciliter), 29 with dust-related lung disease (including 16 with asbestosis, 12 with lung cancer and one with silicosis), and two each with noise-induced hearing loss and other respiratory disease.

Illness Information

Table 4 shows the distribution of diagnoses or clinical impressions by reporting source. Diagnoses were grouped by major International Classification of Diseases categories (ICD-10th Revision).

Poisonings were the most frequently reported condition, with 5,574 (75%) cases. Diseases of the musculoskeletal system were the 2nd most frequently reported conditions with 432 (6%) cases. Diseases of the ear were the 3rd most reported condition, including noise-induced hearing loss, with 387 cases representing 5% of all reports submitted. Respiratory diseases were the 4th most frequently reported conditions with 371 (5%) cases. Signs, symptoms and ill-defined diseases were the 5th most frequently reported, with 316 (4%) cases. There were 145 (2%) skin disease reports, 53 (1%) reports of eye-related diseases, 49 (1%) neoplasms, 48 (1%) reports of mental disorders, and 64 (1%) reports of diseases of the nervous system. Less frequently reported conditions included infectious diseases, diseases of the blood, diseases of the circulatory system, diseases of the digestive

RESULTS, continued...

Table 4
2017 OD Reports by Disease Type (ICD-10) and Reporting Source

	Non-Company		Company		Total	
DISEASE TYPE	#	%	#	%	#	%
Infectious & Parasitic Diseases (ICD A00 –B99)	0	--	5	0.1	5	0.1
Neoplasms (ICD C00-D49)	49	1.7	0	--	49	0.7
Blood and Blood Forming Organs (ICD D50-D89)	2	<0.1	0	--	2	<0.1
Endocrine, Nutritional and Metabolic Disorders (ICD E00-E89)	0	--	0	--	0	--
Mental Disorders (ICD F01-F99)	0	--	48	1.0	48	0.6
Nervous System (ICD G00-G99)	0	--	64	1.4	64	0.9
Eye and Adnexa (ICD H00-H59)	0	--	53	1.1	53	0.7
Ear and Mastoid Process (ICD H60-H95)	2	<0.1	385	8.3	387	5.2
Circulatory System (ICD I00-I99)	0	--	3	0.1	3	<0.1
Respiratory System (ICD J00-J99)	272	9.7	99	2.1	371	5.0
Digestive System (ICD K00-K95)	0	--	14	0.3	14	0.2
Skin & Subcutaneous Tissue (ICD L00-L99)	3	<0.1	142	3.0	145	1.9
Musculoskeletal System & Connective Tissue (ICD M00-M99)	5	0.2	427	9.2	432	5.8
Genitourinary System (ICD N00-N99)	0	--	4	0.1	4	0.1
Symptoms, Signs & Ill-Defined Conditions (ICD R00-R99), Other Causes of Morbidity (V00-Y99) and Factors Affecting Health (Z00-Z99)	22	0.8	294	6.3	316	4.5
Lead Poisoning (T56)	1,548	55.2	0	--	1,548	20.7
Other Poisonings (T65)	894	31.9	0	--	894	12.0
Toxic Effects of Substances - Injury, Poisoning and Certain Other Consequences of External Causes (ICD S00-T88, except T56 and T65)	6	0.2	3,126	67.0	3,132	41.9
TOTAL	**2,803**		**4,664**		**7,467**	

system, and diseases of the genitourinary system.

Reporting Source Differences

Company and non-company-affiliated providers differed in the types of occupational diseases reported (Table 4). Sixty-seven percent of reports from company health care providers were of toxic effect of substances (poisoning), compared to 87% of reports by non-company providers representing these same diagnoses as the top most frequently reported conditions. The second, third and fourth most frequently reported diagnoses for company providers were musculoskeletal diseases (9%), symptoms, signs and ill-defined conditions (6%), and skin diseases (3%). Respiratory conditions were the second most frequently reported diagnoses by non-company providers (10%). The third and fourth most frequently reported diagnoses for non-company providers were neoplasms (2%) and signs and symptoms (1%).

Company and non-company practitioners differed by industries represented in their reports (Table 5). The most frequently-reported industry from company-affiliated providers was manufacturing (59%), primarily automobile production. The second and third most frequently reported industries by company providers were retail trade (8%) and administrative and support (6%). The top industry for non-company providers manufacturing (35%) and the second was construction (32%). The third industry type most frequently reported by non-company providers was utilities (14%). Industry type was missing on 2,082 non-company and 311 company reports.

Gender Differences

Toxic effect of substances (poisoning) was the most frequently reported diagnosis for men and women, with 75% of submissions each (Table 6). The second, third and fourth most frequent diagnoses for women were musculoskeletal diseases (9%), signs and symptoms (7%), and respiratory diseases (3%). For men, the second, third and fourth most frequently reported diagnoses were ear disorders including noise-induced hearing loss (7%), respiratory diseases (6%) and musculoskeletal diseases (4%). Seventy-eight reports did not indicate gender.

RESULTS, continued...

Table 5
2017 OD Reports by Industry Type and Reporting Source

North American Industry Classification System		Non - Company		Company		Total	
		#	%	#	%	#	%
11	Ag, Forestry Fishing & Hunting	0	--	0	--	0	--
21	Mining	0	--	3	0.1	3	0.1
22	Utilities	99	13.7	6	0.1	105	2.1
23	Construction	232	32.2	183	4.2	415	8.2
31-33	Manufacturing	254	35.2	2,576	59.2	2,830	55.8
42	Wholesale Trade	35	4.9	41	0.9	76	1.5
44-45	Retail Trade	26	3.6	334	7.7	360	7.1
48-49	Transportation & Warehousing	0	--	125	2.9	125	2.5
51	Information	0	--	13	0.3	13	0.3
52	Finance & Insurance	2	0.3	10	0.2	12	0.2
53	Real Estate & Rental & Leasing	0	--	46	1.1	46	0.9
54	Professional, Scientific & Tech Svcs	7	1.0	66	1.5	73	1.4
55	Mgt of Companies & Enterprises	0	--	2	<0.1	2	<0.1
56	Administrative & Support & Waste Mgt & Remediation Svcs	2	0.3	268	6.2	270	5.3
61	Educational Services	5	0.7	156	3.6	161	3.2
62	Health Care & Social Assistance	13	1.8	264	6.1	277	5.5
71	Arts, Entertainment & Recreation	14	1.9	7	0.2	21	0.4
72	Accommodation & Food Services	0	--	95	2.2	95	1.9
81	Other Services (excl Public Admin)	11	1.5	71	1.6	82	1.6
92	Public Administration	21	2.9	87	2.0	108	2.1
	Total[a]	721		4,353		5,074	

[a]Industry was unknown for 2,082 non-company reports and 311 company reports.

Table 6
2017 OD Reports by Disease Type and Gender

	Males		Females	
	#	%	#	%
Infectious & Parasitic Diseases (ICD A00 –B99)	3	0.1	2	0.1
Neoplasms (ICD C00-D49)	49	1.0	0	--
Blood and Blood Forming Organs (ICD D50-D89)	0	--	0	--
Endocrine, Nutritional & Metabolic Disorders (ICD E00-E89)	0	--	0	--
Mental Disorders (ICD F01-F99)	20	0.4	22	0.9
Nervous System (ICD G00-G99)	34	0.7	32	1.3
Eye and Adnexa (ICD H00-H59)	40	0.8	13	0.5
Ear and Mastoid Process (ICD H60-H95)	345	6.9	41	1.7
Circulatory System (ICD I00-I99)	1	<0.1	2	0.1
Respiratory System (ICD J00-J99)	299	6.0	72	3.0
Digestive System (ICD K00-K95)	11	0.2	3	0.1
Skin & Subcutaneous Tissue (ICD L00-L99)	98	2.0	47	1.9
Musculoskeletal System & Connective Tissue (ICD M00-M99)	217	4.4	214	8.9
Genitourinary System (ICD N00-N99)	4	0.1	0	--
Symptoms, Signs & Ill-Defined Conditions (ICD R00-R99), Other Causes of Morbidity (V00-Y99) and Factors Affecting Health (Z00-Z99)	149	3.0	168	7.0
Toxic Effects of Substances - Poisonings (ICD S00-T88)	3,705	74.5	1,798	74.5
TOTAL[a]	**4,975**		**2,414**	

[a]Gender was not listed for 78 individuals.

Fatalities

Fatalities related to occupational illnesses were reported for 44 workers (Table 7). None of the illness-related fatalities reported were from acute incidents. Non-company clinicians reported 42 of the 44 fatalities. The workers who died ranged in age from 28 to 92 years. Twenty-six died from asbestos-related cancer, 15 from asbestosis and three from other lung diseases. Thirteen of the deceased workers had been employed in construction and one in manufacturing. Former industry was not specified for 30 workers.

Michigan has a separate program to track acute traumatic fatalities, called MIFACE (Michigan Fatality Assessment and Control Evaluation). The MIFACE program identified an additional 153 traumatic work-related fatalities from injuries in 2017 that occurred in Michigan. A separate report for the most recent work-related fatalities (2016 calendar year) can be found at: www.oem.msu.edu. There were two acute work-related injuries resulting in deaths among youths in the MIFACE Program in 2017.

MI Fatality Assessment & Control Evaluation

RESULTS, continued...

Comparison with Other Data Systems

No one reporting system captures the true burden of occupational disease. The following section looks at other reporting systems and the contribution each makes to the overall characterization of work-related illness in our state.

Published Aggregate Data in MI

Table 8 compares data from the OD reporting system with Workers' Compensation Agency paid claims and the BLS Annual Survey. These data illustrate the variation of reported disease categories by reporting source and suggest that the magnitude of occupational diseases among Michigan workers is greater than what is currently reported by any one system.

The most quoted data source on occupational injuries and illnesses available in Michigan comes from the BLS Annual Survey of company injury and illness logs. In 2016, there were a total of 111,700 injuries and illnesses of which 54,200 were severe enough to cause loss of work days, job transfer or restriction. Of the 111,700 total, 6,400 were occupational illnesses and 105,300 were occupational injuries.

Data from Michigan's Workers' Compensation Agency (WCA) for 2017 showed 20,427 paid claims for occupational injuries and illnesses with seven or more consecutive days away from work; 12,355 of those paid claims are for illnesses (Table 8). Overall in 2017, about $442 million in compensation was paid by insurance companies and self-insured employers on 167,463 claims for both lost work time and medical-only costs. These paid claims include new claims filed in 2017, as well as previous claims for workers who continue to lose work time or incur medical costs due to their injury or illness. Seventy-one percent of the total paid claims in 2017 were for medical procedures or care only and 29% for wage loss (http://www.michigan.gov/documents/wca/wca_2017_Annual_Report_619017_7.pdf).

Table 7
Demographic Characteristics of Reported Occupational Disease Fatalities in 2017

Demographic Characteristic		
Vital Status	**#**	**%**
Fatal	44	0.6
Non-Fatal	7,423	99.4
Total	**7,467**	
Age	**#**	**%**
20 - 39	1	2.3
40 - 59	7	15.9
60 - 69	12	27.3
70 - 79	18	40.9
≥ 80	6	13.6
Total	**44**	
Disease Type	**#**	**%**
Neoplasm-asbestos-related	26	59.1
Asbestosis	15	34.1
Other– lung	3	6.8
Total	**44**	
Industry	**#**	**%**
Manufacturing	1	7.1
Construction	13	92.9
Total	**14[a]**	

[a]Industry was missing on 30 reports.

Other Sources-Hospital Discharge Data

The hospital discharge data described in this next section is not part of the 7,467 occupational disease reports described in this 2017 Annual Report of Occupational Diseases. Hospital discharge data does not include identifiers; presumably some of the patients overlap with those in the 7,467 OD reports. However, especially for long latency, chronic diseases like asbestosis, it would be difficult to identify newly diagnosed patients. Therefore, the hospitalization data in this section should be considered as supplemental to the 7,467 OD reports submitted to the State in 2017. The most recent data available from the MHA is for calendar year 2016. The following section looks at hospital data where Workers' Compensation is the expected payer.

If the source of payment changed after the patient was treated and discharged from the hospital, such as might occur in a disputed workers' compensation case, it is likely that this change would not be captured in the MHA data reported in this section. Figure 4 shows the number of patients, as well as hospitalizations, with Workers' Compensation (WC) insurance designated as the primary payment source at discharge for the years 1992 through 2016; the numbers of hospitalizations from 1995

RESULTS, continued...

Table 8
Comparison of 2016 Bureau of Labor Statistics (BLS) Occupational Illness Survey Data and 2017 LARA Workers' Compensation Agency (WCA) Claims with 2008—2017 LARA Occupational Disease (OD) Reports

	Disease Category														
	Skin		Lung—Dust		Lung—Toxic		Poisoning		Physical Agents		Repeated Trauma		All Other		Total
	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#
BLS Survey															
Year	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#
2016	900	14.4	ND	--	400	7.8	0	--	ND	--	ND	--	5,100	79.7	6,400
WCA Claims															
Year	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#
2017	25	0.2	1	<0.1	54	0.4	3	<0.1	28	0.2	9,998	80.9	2,246	18.2	12,355
LARA OD Reports[a]															
Year	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#
2008	196	2.9	905	13.2	600	8.7	1,811	26.4	13	0.2	2,305	33.5	1,042	15.2	6,872
2009	258	4.1	321	5.1	372	5.9	1,782	28.1	176	2.8	1,892	29.8	1,544	24.3	6,345
2010	263	3.5	440	5.9	841	11.3	1,750	23.5	190	2.5	2,394	32.1	1,573	21.1	7,451
2011	499	4.9	459	4.5	634	6.3	1,716	17.0	237	2.3	3,974	39.3	2,589	25.6	10,108
2012	378	5.0	328	4.3	419	5.5	1,442	18.9	46	0.6	2,892	38.0	2,106	27.7	7,611
2013	347	4.0	274	3.2	439	5.1	2,192	25.5	45	0.5	3,263	37.9	2,041	23.7	8,601
2014	338	4.5	371	4.9	458	6.1	1,808	23.9	181	2.4	2,547	33.7	1,863	24.6	7,566
2015	185	2.8	340	5.1	261	3.9	1,826	27.6	99	1.5	2,307	34.9	1,598	24.2	6,616
2016	259	3.5	341	4.6	427	5.7	2,325	31.3	202	2.7	2,601	35.0	1,280	17.2	7,435
2017	157	3.7	170	4.0	205	4.8	2,470	58.4	73	1.7	488	11.5	666	15.7	4,229

ND = There was no data for this disease category. NS = Data too small to be displayed.
[a] Totals for LARA OD Reports are less than the total number of submitted reports for each year because some of the reports cannot be assigned to the disease categories used by BLS and the WCA. In 2017, there were 3,238 reports that could not be classified for this table.

-2016 decreased compared to the years 1992-1994. In addition, the percentage of hospitalizations with WC insurance designated as the primary payment source at discharge decreased after 1993 (Figure 5). For both these parameters, there was a plateau in the decrease from 2004 to 2008. However, there was also a decrease in 2009-2016 in both these parameters. In 2009, 0.30% of the 1,305,935 Michigan hospitalizations designated WC insurance as the primary payment source at discharge; in 2016 0.20% of the 1,240,399 Michigan hospitalizations designated WC insurance as the primary payment source at discharge.

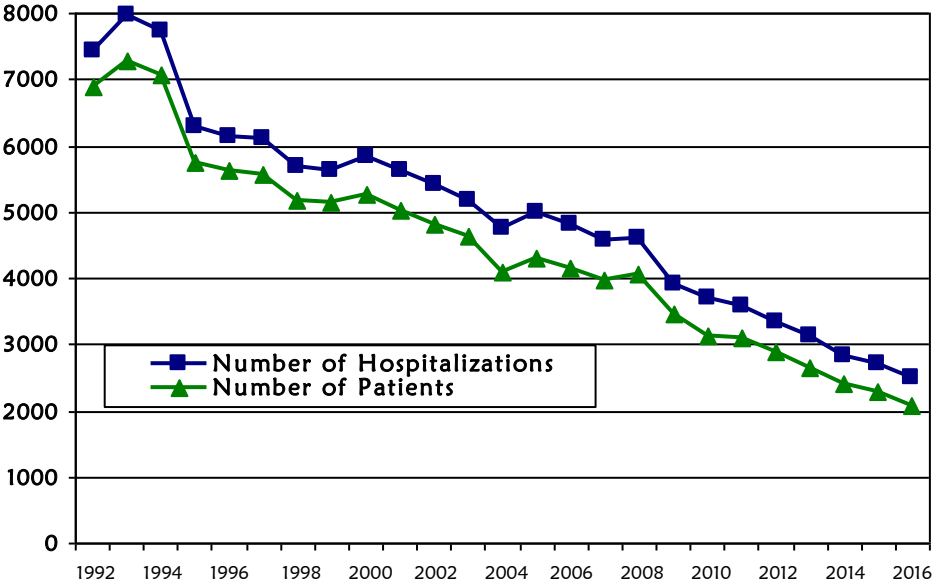
Table 9 shows the primary discharge diagnosis for hospitalizations from 2011 to 2016 where WC insurance was designated as the primary payment source at discharge. Data for 2002 through 2010 can be found in prior reports. In the 4th quarter of 2015, hospitals converted to the ICD-10 coding system; therefore reports from the 4th quarter of 2015 forward will be coded to ICD-10 disease categories. WC insurance covers a broad range of conditions, including mental illness, infections, heart disease and cancer. The most common hospitalized conditions covered by WC insurance were injuries and poisoning accounting for 56%, and musculoskeletal diseases, accounting for 21% of all WC-related patient hospitalizations in 2016.

Table 10 lists the demographics of patients with WC insurance as the primary payment source at discharge. From 70-77% of the hospitalizations were for men, across all years from 2011 to 2016. Data for 2002 through 2010 can be found in prior reports. Among hospitalizations for which race was known, approximately 85-90% were white, 7-11% were African American, <1% were Asian, and 2-5% were listed as "other."

Most hospitalizations involved workers between 40-59 years. Less than 1% involved workers under the age of 15. The percentage of workers 80 years or older has ranged over time from <1-4%. The percentage of hospitalizations of workers under the age of 20 has decreased slightly over time, from 3% in 1992 to 1% in 2015 and increased to 2% in 2016 (1992 data not shown).

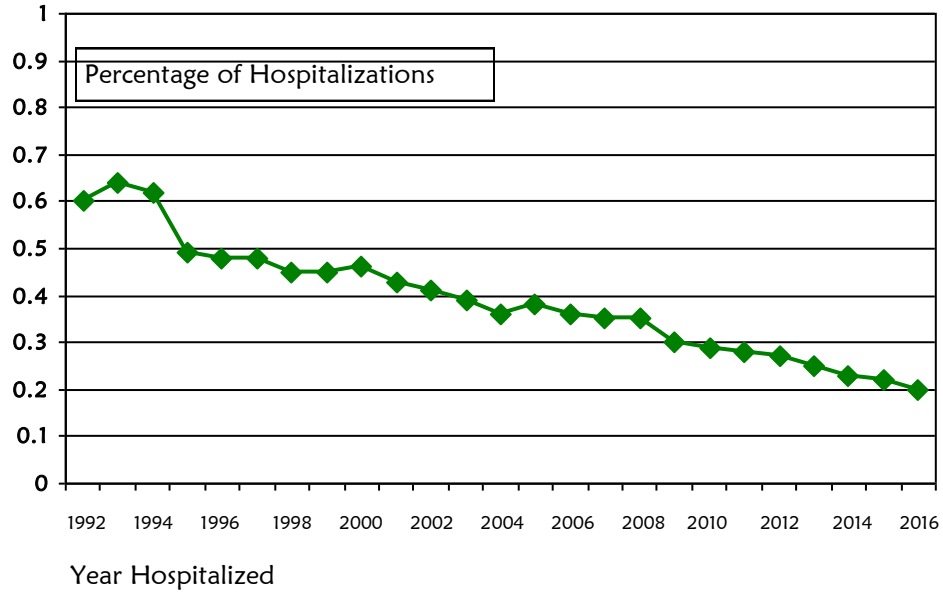
RESULTS, continued...

Figure 4
Hospitalizations and Patients with Workers' Compensation Designated as the Primary Payment Source at Discharge in Michigan: 1992-2016



The number of hospitalizations and patients with Workers' Compensation as the primary source of payment in Michigan has steadily declined over time.

Figure 5
Percent of Total Michigan Hospitalizations with Workers' Compensation Designated as the Primary Payment Source at Discharge in Michigan: 1992-2016



In calendar year 2016, there were 1,240,399 hospitalizations in Michigan. Of those, only 0.20% were paid for by Workers' Compensation. The percent of hospitalizations paid for by Workers' Compensation in Michigan has steadily declined over time.

RESULTS, continued...

Table 9 Primary Diagnosis of Hospitalizations in Michigan from 2011-2016, with Workers' Compensation Designated as Primary Payment Source at Discharge

	Year of Hospitalization							
	2011	2012	2013	2014	2015 Q123		2015 Q4	2016
1º Discharge Diagnosis ICD-9	%	%	%	%	%	**1º Discharge Diagnosis ICD-10**	%	%
Infectious Diseases (001-139)	1.5	1.7	2.2	2.6	2.0	Infectious & Parasitic Diseases (A00 – B99)	4.1	2.5
Neoplasms (140-239)	0.4	0.2	0.1	0.1	0.1	Neoplasms (C00-D49)	0.2	0.3
Endocrine Diseases (240-279)	0.7	0.7	0.7	0.6	0.5	Blood & Blood Forming Organs (D50-D89)	—	0.2
Blood Diseases (280-289)	0.1	0.2	0.1	0.2	0.1	Endocrine & Metabolic (E00-E89)	0.3	0.5
Mental Disorders (290-319)	1.0	0.6	1.0	0.9	0.6	Mental Disorders (F01-F99)	0.9	0.3
Nervous System Diseases (320-389)	1.8	2.1	2.1	1.9	1.4	Nervous System (G00-G99)	1.7	2.1
Circulatory Diseases (390-459)	4.7	3.9	3.1	4.0	3.5	Eye and Adnexa (H00-H59)	0.2	<0.1
Respiratory Diseases (460-519)	1.9	2.4	1.8	2.1	2.3	Ear and Mastoid Process (H60-H95)	—	<0.1
Digestive Diseases (520-579)	1.9	2.0	1.8	1.9	1.9	Circulatory System (I00-I99)	2.7	3.8
Genitourinary Diseases (580-629)	1.3	0.9	0.8	1.0	0.7	Respiratory System (J00-J99)	2.4	2.5
Pregnancy Complications (630-676)	0.3	0.1	0.3	0.4	0.3	Digestive System (K00-K95)	1.7	2.5
Skin Diseases (680-709)	5.2	5.6	5.0	5.0	4.8	Skin & Subcutaneous Tissue (L00-L99)	5.8	4.5
Musculoskeletal Diseases (710-739)	28.7	28.5	24.7	23.6	24.0	Musculoskeletal (M00-M99)	22.9	20.6
Congenital Anomalies (740-759)	0.3	0.2	0.2	0.1	0.1	Genitourinary System (N00-N99)	0.5	1.2
Perinatal Complications (760-779)	--	--	--	—	—	Pregnancy and Perinatal (O00-P96)	0.9	0.3
Symptoms & Signs (780-799)	1.6	1.4	1.3	1.4	1.5	Congenital Anomalies (Q00-Q99)	0.2	0.1
Injury & Poisoning (800-999)	44.2	44.0	48.9	48.5	50.0	Symptoms, Signs (R00-R99)	1.6	1.4
V Codes	4.6	5.3	5.9	5.8	6.4	Toxic Effects - Poisonings (S00-T88)	53.9	56.1
						Factors Affecting Health (Z00-Z99)		1.1
Total[b]	**3589**	**3333**	**3127**	**2823**	**2053**	**Total**	**634**	**2,485**

[a]Totals vary due to missing information.

Table 10 Demographics of Hospitalizations in Michigan, 2011-2016, with Workers' Compensation Designated as Primary Payment Source

	2011	2012	2013	2014	2015	2016
Gender	**%**	%	%	%	%	%
Male	74	75	75	76	77	77
Female	26	25	25	24	23	23
Total[a] #	**3589**	**3333**	**3127**	**2823**	**2701**	**2485**
Race	**%**	%	%	%	%	%
White	89	87	88	87	86	87
African Am	8	9	9	8	9	10
Asian	<1	<1	<1	1	<1	<1
Other	3	4	3	4	5	3
Total[a] #	**2659**	**2557**	**2532**	**2286**	**2402**	**2323**
Age	**%**	%	%	%	%	%
< 15	<1	<1	<1	<1	<1	<1
15-19	1	1	1	1	1	2
20-39	27	25	25	27	26	28
40-59	53	55	54	54	53	49
60-79	15	17	18	17	19	20
≥ 80	4	1	1	1	1	1
Total[a] #	**3589**	**3333**	**3127**	**2823**	**2701**	**2485**
Avg Age, standard deviation	48 ±15	48 ±13	48 ±14	47 ±14	48 ±14	48 ±15

[a]Totals vary due to missing information.

RESULTS, continued...

Poison Control Center Data

In 2017, 894 calls to the Michigan Poison Control Center (PCC) were identified for individuals with work-related symptoms. Table 11 describes available demographic characteristics and exposures of the individuals reported. There were more reports for males (61%). The individuals ranged in age from 14 to 76 years. Eighty-one percent of these individuals with known age were less than age 50. Of the 894 calls to the PCC in 2017, the top calls included exposures to: 238 (27%) cleaning agents, 61 (7%) herbicides/pesticides, 54 (6%) acids, 48 (5%) medications, and 45 (5%) fuel/gases.

Table 11
Demographic Characteristics of 894 Individuals Reported by the Michigan Poison Control Center in 2017

Demographic Characteristics		
Age	#	%
14-19	55	7.0
20-29	277	35.3
30-39	174	22.2
40-49	126	16.1
50-59	114	14.5
60-69	34	4.3
≥ 70	4	0.5
Total	**784**[a]	
Gender	#	%
Male	502	60.6
Female	327	39.4
Total	**829**[b]	
Top Exposures at Work	#	%
Cleaning Agents	238	26.6
Herbicides/Pesticides	61	6.8
Acids	54	6.0
Medication	48	5.4
Fuel/Gases	45	5.0
Metal Fume	32	3.6
Freon	31	3.5
Oils/Lubricants	27	3.0
Carbon Monoxide	25	2.8
All Other Exposures	333	37.2
Total	**894**	

[a]Age was unknown for 110 reports.
[b]Gender was missing on 65 reports.

Adult Blood Lead Epidemiology and Surveillance (ABLES)

In 2017, there were 25,667 adult Michigan residents reported by labs as having their blood tested for lead. Table 12 describes the demographic characteristics of the 1,548 individuals reported with a blood lead level of 5 ug/dL and above. Most individuals were males between the ages of 30 and 59. Construction and manufacturing were the most frequently reported industries of lead exposure. A comprehensive report on all blood lead levels in Michigan can be found at: www.oem.msu.edu, the 2015-2016 Annual Report on Blood Lead Levels on Adults in Michigan.

Table 12
Demographic Characteristics of 1,548 Individuals Reported by Laboratories with Elevated Blood Lead in Michigan, 2017

	Blood Lead Level			
	>=5 & <10 *u*g/dL		>=10 *u*g/dL	
Age	#	%	#	%
16-19	7	0.8	3	0.4
20-29	113	13.0	95	14.1
30-39	185	21.2	135	20.0
40-49	183	21.0	147	21.7
50-59	167	19.2	135	20.0
60-69	127	14.6	127	18.8
≥ 70	90	10.3	34	5.0
Total	**872**		**676**	
Gender	#	%	#	%
Male	723	82.9	630	93.2
Female	149	17.1	46	6.8
Total	**872**		**676**	
Industry	#	%	#	%
Construction	93	34.3	94	26.3
Manufacturing	80	29.5	152	42.6
Utilities	56	20.7	43	12.0
Trade	16	5.9	44	12.3
Public Admin	11	4.1	3	0.8
Arts & Entertainment	6	2.2	8	2.2
Admin & Support	0	—	1	0.3
Transportation	0	—	0	—
Other Services	4	1.5	6	1.7
Prof & Scientific	4	1.5	3	0.8
Educational Services	0	—	1	0.3
Health Care	1	0.4	2	0.6
Accomod & Food Svc	0	—	0	—
Total	**271**[a]		**357**[a]	

[a] Industry was missing on 601 reports of blood lead levels <10 ug/dL and on 319 reports of blood leads >=10ug/dL.

DISCUSSION

There were 7,467 Occupational Disease Reports sent to LARA in calendar year 2017. These reports do not include occupational injuries. The most frequent types of occupational diseases reported to LARA were toxic effects of substances (75%), noise-induced hearing loss and ear disorders (5%), respiratory disorders (5%0 and signs and ill-defined conditions (4%). From 1988 through 1999, the number of reports sent to the State increased substantially. Figure 2 shows the number of occupational disease reports received each year since 1985. Since 1999, the number of reports had been decreasing, except for the increases in 2003, 2010, 2011, 2013 and 2016. There was a large decrease in the number of reports received in 2005, with over 2,200 fewer reports received than in 2004; in 2009 the total number of reports decreased by over 640 from 2008. In 2010, the number of reports increased to 7,952, an increase of over 1,000 reports since 2009, and in 2011 to 10,701, an increase of almost 4,000 reports, a decrease of 2,548 reports in 2012, an increase of 1,554 reports in 2013, a decrease of 1,395 reports in 2014, a decrease of 756 reports in 2015, an increase of 1,067 reports in 2016, and a decrease of 1,072 reports in 2017.

The initial overall decline in the number of reports reflected fewer reports from company medical departments. The number of reports from non-company-affiliated practitioners remained relatively unchanged through 2004; however, from 2004 to 2009, there was a large decline of approximately 3,000 reports in the number of non-company-affiliated practitioner reports as compared to 2004 (Figure 3). The number of company-affiliated physicians or medical departments reporting decreased in 2017 to 70, compared to 88 in 2016, 100 in 2015, 190 in 2014, 210 in 2013, 179 in 2012, 188 in 2011, 185 in 2010, 194 in 2009, 449 in 2008, 426 in 2007, 396 in 2006, 374 in 2005, 373 in 2004 and 305 in 2003.

ICD-10 codes were used to classify the diagnosis or clinical impression recorded on the occupational disease reports submitted to LARA. Sprains and strains, except those involving the back, are considered by the federal and Michigan OSHA programs as illnesses secondary to cumulative trauma, and are therefore required to be reported even though in the ICD-10 coding system, sprains and strains are classified as injuries.

Many employers, physicians and other healthcare providers do not report patients with occupational diseases either because they are unaware of the reporting law or choose not to report for a different reason. Currently, reports are received from approximately 70 company-affiliated physicians reporting employees from 1,128 different companies; there were 68 non-company-affiliated physicians reporting patients to the state. There were 244,927 companies in the year 2017 and 31,418 licensed physicians in Michigan in the year 2017. Accordingly, reports are received from 0.5% of companies and 0.2% of physicians. Over the last several years, these percentages have remained largely unchanged. Efforts continue to remind employers of the requirement to report by routinely distributing reporting forms during MIOSHA inspections. In addition, all new physicians receive information on the requirement to report when they apply for medical licensure in Michigan.

The 7,467 occupational disease reports received this past year under-represent the actual incidence of occupational diseases in Michigan. Based on an MSU study matching multiple data bases in Michigan for the years 1999-2001, one could estimate that the BLS survey missed 50% of the total number of occupational illnesses in Michigan[2]. For 2016, the most recent year available, the BLS annual survey reported 6,400 illnesses; by extension one would expect 12,800 illnesses in 2016 instead of the approximately 8,500 reported in 2016. Even these types of estimates are an underestimate because it assumes that all physicians recognize work-related illness in their patients and that all employers are informed when work-related conditions are diagnosed. These assumptions often go unmet, given the limited training that healthcare providers receive in diagnosing work-related conditions, and that many individuals never inform their employer when they are diagnosed with a work-related condition.

The type of illness and industry where occupational diseases occur as reported by non-company-affiliated healthcare practitioners differs from company-based healthcare practitioners (Tables 1, 4 and 5). The differences vary depending on the specialties of the non-company-affiliated physicians who submit reports. For example, in 2017 the non-company-affiliated health care practitioners were more likely to report patients with respiratory disease who work in small, non-manufacturing companies. A large percentage of the

DISCUSSION

year 2017 reports from non-company-affiliated health care practitioners were from physicians who are specialists in the radiographic interpretation of mineral and dust-related lung disease. However, regardless of the mix of non-company-affiliated specialists reporting, the data illustrates that relying on company-affiliated reports alone would cause occupational illness statistics to markedly undercount certain work-related conditions. Similarly, one cannot rely on Workers' Compensation data alone for a reliable count of work-related conditions. First, in Michigan, only injuries (20,427) or illnesses with seven or more days away from work are computerized. Therefore, all the injuries and illnesses with less lost work time or those who received medical care only (167,463) cannot be analyzed as to type of injury. Second, in a study covering the years 1992-1994, only 9.6% of the workers for whom an Occupational Disease Report was submitted had definitely filed a WC claim, although an additional 36% may have filed a claim for a total of 45.6%[3]. In that study, limits of the data did not allow for a more precise estimate of the claims filed, but the range underscores the point that a large number of workers do not file WC claims even though they are seen by a physician for their illness. This is an ongoing issue, as review of hospital discharge data for individuals with pneumoconioses shows only <1% - 8% paid by WC (2016 Annual Report: Tracking Silicosis and Other Work-Related Lung Diseases in Michigan, available at: www.oem.msu.edu).

Review of Table 8 shows differences in the distribution of occupational illnesses identified through the state's OD reporting system, compared to both the BLS Annual Survey of Employers and the state's WCA claims system. For example, poisoning represents approximately 58% (2,470) of the OD reports, while that category of diseases accounts for no cases in the BLS survey and <1% (3 cases) of WCA claims. Non-employer sources such as from the Poison Control Center, "B" Readers and laboratories provide additional occupational diseases not being reported by employers or practitioners.

In 2018, the National Academies of Science issued a comprehensive report on the status of occupational injury and illness surveillance in the United States. The report found that the US surveillance system markedly undercounted work-related injuries and illnesses and accordingly missed many opportunities to prevent these conditions[4]. Implementation of the recommendations in this report would markedly improve the tracking of occupational injuries and illnesses nationwide. The report discusses the role of states and makes numerous recommendations for activities at the state level.

Although it has been reassuring to see the drop in hospitalizations related to work (Figures 4 and 5), our 2015 Annual Report showed that the drop is due to a decrease in minor but not severe injuries (2015 Annual Report—Summary of Occupational Diseases Reported to the MI Department of Licensing and Regulatory Affairs). Increased effort to reduce these severe injuries may be assisted by the new requirements that were implemented in Michigan on 9-1-2015 for employers to report acute work-related hospitalizations (http://www.michigan.gov/lara/0,4601,7-154-10573_11472-370952—,00.html). In addition to tracking the overall incidence of occupational disease, a more comprehensive system allows us to identify areas of concern in our state, monitor trends, develop interventions designed to prevent additional occupational disease, and subsequently evaluate the effectiveness of these efforts.

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